CLAIMS

1. A method for recording and reproduction on a magneto-optical recording medium including a plurality of magnetic layers, in which multi-valued information is recorded on the magneto-optical recording medium as a combination of magnetization states of the respective magnetic layers, and the multi-valued information is reproduced on the basis of an aggregate of the magnetization states of the respective magnetic layers, characterized in that:

the plurality of the magnetic layers are irradiated with light beams having wavelengths λ_1 and λ_2 ($\lambda_2 \neq \lambda_1$) respectively, signals reproduced from reflected light beams having the respective wavelengths are converted into two-valued or higher multi-valued reproduction signals respectively, and then the converted reproduction signals concerning the respective wavelengths are mutually subjected to logical operation to reproduce the recorded multi-valued information.

2. The method for recording and reproduction on the magneto-optical recording medium according to claim 1, wherein the magneto-optical recording medium to be used is a magneto-optical recording medium in which a ratio of intensities of reproduction signals detected for a plurality of magnetization states determined by the

combination of the magnetization states, concerning the reproduction signals obtained at the wavelength λ_1, is mutually different from that concerning reproduction signals obtained at the wavelength λ_2.

3. The method for recording and reproduction on the magneto-optical recording medium according to claim 1 or 2, wherein the magneto-optical recording medium to be used is a magneto-optical recording medium in which an order of intensities of a plurality of reproduction signals detected for a plurality of magnetization states determined by the combination of the magnetization states, obtained upon detection at the wavelength λ_1, is mutually different from that obtained upon detection at the wavelength λ_2.

4. The method for recording and reproduction on the magneto-optical recording medium according to claim 3, wherein the magneto-optical recording medium to be used is a magneto-optical recording medium including two magnetic layers capable of four-valued recording on the basis of four combined magnetization states, in which magnitudes of reproduction signals θ_1 to θ_4 from the four magnetization states, obtained upon reproduction at the wavelength λ_1, are different from those obtained upon reproduction at the wavelength λ_2, wherein:

the two magnetic layer are irradiated with the light beams having the wavelengths λ_1 and λ_2 respectively,

signals reproduced from respective reflected light beams are sliced by using at least one level to obtain two-valued or higher multi-valued reproduction signals respectively, and the two-valued or higher multi-valued reproduction signals concerning the respective wavelengths are mutually subjected to logical operation to reproduce information recorded by four-valued recording.

5. A method for recording and reproduction on a magneto-optical recording medium including a plurality of magnetic layers, in which multi-valued information or a plurality of two-valued information series are recorded on the magneto-optical recording medium as a combination of magnetization states of the respective magnetic layers, and the multi-valued information or the plurality of the two-valued information series are reproduced on the basis of an aggregate of the magnetization states of the respective magnetic layers, characterized in that:

the plurality of the magnetic layers are irradiated with light beams having wavelengths λ_1 and λ_2 respectively, information recorded on one of the magnetic layers is reproduced by using the light beam having the wavelength λ_1, information recorded on another of the magnetic layers is reproduced by using the light beam having the wavelength λ_2 ($\lambda_2 \neq \lambda_1$), and thus information is independently reproduced from each of the magnetic layers.

6. The method for recording and reproduction on the magneto-optical recording medium according to claim 5, wherein the magneto-optical recording medium to be used is a magneto-optical recording medium in which an order of intensities of a plurality of reproduction signals detected for a plurality of magnetization states determined by the combination of the magnetization states, obtained upon detection at the wavelength λ_1, is mutually different from that obtained upon detection at the wavelength λ_2.

7. The method for recording and reproduction on the magneto-optical recording medium according to claim 5 or 6, wherein information recorded on one of the magnetic layers is reproduced by radiating a light beam having the wavelength λ_1 or λ_2, while the reproduced information is combined with information to be recorded on another of the magnetic layers to perform recording by using a recording light beam having the wavelength λ_1 or λ_2, and thus only information on the another of the magnetic layers is rewritten in a virtual manner.

8. The method for recording and reproduction on the magneto-optical recording medium according to claim 7, wherein the magneto-optical recording medium to be used is a magneto-optical recording medium including two magnetic layers capable of four-valued recording on the basis of four combined magnetization states, in which an order of

magnitudes of reproduction signals θ_1 to θ_4 from the four magnetization states, obtained upon detection at the wavelength λ_1, is different from that obtained upon detection at the wavelength λ_2, and wherein:

two-valued information on one of the magnetic layers is reproduced by using the light beam having the wavelengths λ_1, and two-valued information on the other magnetic layer is reproduced by using the light beam having the wavelengths λ_2.

9. The method for recording and reproduction on the magneto-optical recording medium according to claim 8, wherein a two-valued signal converted into two-valued one by slicing, at a predetermined level, a reproduction signal including the four magnetization states detected at the wavelength λ_1 corresponds to a two-valued magnetization state of one of the magnetic layers, and a two-valued signal converted into two-valued one by slicing, at a predetermined level, a reproduction signal including the four magnetization states detected at the wavelength λ_2 corresponds to a two-valued magnetization state of the other magnetic layer.

10. The method for recording and reproduction on the magneto-optical recording medium according to claim 7, wherein information is independently recordable on each of the magnetic layers, and information is independently

reproducible from each of the magnetic layers by selecting the wavelength of the light beam with which the magneto-optical recording medium is irradiated.

11. The method for recording and reproduction on the magneto-optical recording medium according to claim 1, wherein λ_1 is 350 to 900 nm, and λ_2 is a wavelength different from λ_1 by not less than 50 nm.

12. The method for recording and reproduction on the magneto-optical recording medium according to claim 5, wherein λ_1 is 350 to 900 nm, and λ_2 is a wavelength different from λ_1 by not less than 50 nm.

13. The method for recording and reproduction on the magneto-optical recording medium according to claim 1, wherein the magneto-optical recording medium is irradiated with the light beam at λ_1 and the light beam at λ_2 so that the two beams are collected at different portions on a recording area of the magneto-optical recording medium respectively.

14. The method for recording and reproduction on the magneto-optical recording medium according to claim 5, wherein the magneto-optical recording medium is irradiated with the light beam at λ_1 and the light beam at λ_2 so that the two beams are collected at different portions on a

recording area of the magneto-optical recording medium respectively.

15. A magneto-optical recording medium to be used for the method for recording and reproduction according to claim 1, including a plurality of magnetic layers on a substrate, on which multi-valued information is recorded on the basis of a combination of magnetization states of the plurality of the magnetic layers, characterized in that:

a ratio of magnitudes of Kerr rotation angles read from a plurality of magnetization states determined by the combination of the magnetization states, obtained upon reproduction by using a light beam having a wavelength λ_1, is mutually different from that obtained upon reproduction by using a light beam having a wavelength λ_2.

16. The magneto-optical recording medium according to claim 15, wherein optical path lengths of layers for constructing the magneto-optical recording medium are adjusted so that the ratio of magnitudes of Kerr rotation angles read from a plurality of magnetization states determined by the combination of the magnetization states, obtained upon reproduction by using the light beam having the wavelength λ_1, is mutually different from that obtained upon reproduction by using the light beam having the wavelength λ_2.

17. The magneto-optical recording medium according to claim 15 or 16, wherein a magnetic material for at least one magnetic layer of the plurality of the magnetic layers is selected so that the ratio of magnitudes of Kerr rotation angles read from a plurality of magnetization states determined by the combination of the magnetization states, obtained upon reproduction by using the light beam having the wavelength λ_1, is mutually different from that obtained upon reproduction by using the light beam having the wavelength λ_2.

18. The magneto-optical recording medium according to claim 17, wherein the magnetic material for at least one magnetic layer is garnet.

19. A magneto-optical recording medium to be used for the method for recording and reproduction according to claim 5, including a plurality of magnetic layers on a substrate, on which multi-valued information or a plurality of two-valued information series are recorded on the basis of a combination of magnetization states of the plurality of the magnetic layers, characterized in that:

magnitudes of Kerr rotation angles read from a plurality of magnetization states determined by the combination of the magnetization states differ depending on a wavelength of a reproducing light beam respectively; and

the magneto-optical recording medium has a magneto-

optical characteristic that a curve, which represents variation in the Kerr rotation angle with respect to the wavelength of the reproducing light beam detected from one combined magnetization state, intersects a curve which represents variation in the Kerr rotation angle with respect to the wavelength of the reproducing light beam detected from at least one of other combined magnetization states, in a wavelength range of λ_1 to λ_2 of the wavelength of the reproducing light beam.

20. The magneto-optical recording medium according to claim 19, further comprising at least one dielectric layer and comprising the plurality of the magnetic layers on a substrate, wherein optical path lengths of the at least one dielectric layer and the plurality of the magnetic layers are adjusted so that the magneto-optical recording medium has the magneto-optical characteristic that the curve, which represents variation in the Kerr rotation angle with respect to the wavelength of the reproducing light beam detected from one combined magnetization state, intersects the curve which represents variation in the Kerr rotation angle with respect to the wavelength of the reproducing light beam detected from at least one of other combined magnetization states, in the wavelength range of λ_1 to λ_2 of the wavelength of the reproducing light beam.

21. The magneto-optical recording medium according to

claim 19 or 20, wherein a magnetic material for at least one magnetic layer of the plurality of the magnetic layers is selected so that the magneto-optical recording medium has the magneto-optical characteristic that the curve, which represents variation in the Kerr rotation angle with respect to the wavelength of the reproducing light beam detected from one combined magnetization state, intersects the curve which represents variation in the Kerr rotation angle with respect to the wavelength of the reproducing light beam detected from at least one of other combined magnetization states, in the wavelength range of λ_1 to λ_2 of the wavelength of the reproducing light beam.

22. The magneto-optical recording medium according to claim 21, wherein the magnetic material for at least one magnetic layer is garnet.

23. The magneto-optical recording medium according to claim 19, comprising at least a dielectric layer, first and second magnetic layers, and an auxiliary magnetic layer on the substrate, wherein at least one of the first and second magnetic layers is represented by the following general formula:

$$(Tb_{100-A}Q_A)_X Fe_{100-X-Y-Z}Co_Y M_Z$$

wherein:

15 atomic % ≤ X ≤ 40 atomic %;

5 atomic % ≤ Y ≤ 20 atomic %;

0 atomic % ≤ Z ≤ 15 atomic %;

0 atomic % ≤ A ≤ 30 atomic %;

wherein M is at least one of elements selected from the group consisting of Nb, Cr, Pt, Ti, and Al, and Q is at least one of elements selected from the group consisting of Gd, Nd, and Dy.